**Cardiac output determination by use of lithium dilution during exercise in horses**

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Objective: To compare cardiac output (CO) obtained by the lithium dilution method (LiDCO) with CO calculated from the Fick principle (FickCO), in horses maximally exercising on a high-speed treadmill.

Animals: 13 Thoroughbreds.

Procedures: In part 1 of the study, 5 horses performed a warm-up (walk, trot, and canter) and exercise test (walk, trot, canter, and gallop [90% to 100% maximum oxygen consumption [{VO(2)max}]) with measurements of LiDCO and FickCO obtained simultaneously after 60 seconds at each exercise level, for a total of 7 measurements. In part 2 of the study, 8 horses performed a warm-up (walk, trot, and canter) followed by an exercise test (walk and gallop [90% to 100% [VO(2)max], repeated twice). Measurements of LiDCO and FickCO were obtained 60 seconds into the first walk and each gallop of the exercise tests, for a total of 3 measurements.

Results: Cardiac output increased significantly with increasing speeds by use of both methods. In part 1, lithium dilution significantly overestimated CO, compared with the Fick principle, during the exercise test (as both injection number and exercise intensity increased). Mean +/- SD bias was 246 +/- 264 mL of blood/min/kg in part 1 and 67 +/- 100mL of blood/kg/min in part 2. Three injections of lithium (part 2) did not result in the same degree of overestimation of LiDCO that was observed with 7 injections (part 1).

Conclusions and clinical relevance: Lithium dilution may be an acceptable substitute for the Fick principle as a means to measure CO in maximally exercising client-owned horses.